REMARKS

The specification has been reviewed, and clerical errors of the specification have been corrected.

On page 2 of the Action, the title of the invention was required to change. Accordingly, the title of the invention has been changed as shown in the amendment. On page 2 of the Action, claims 1-4 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, claim 4 was pointed out to include the vague term "micro-hole". Accordingly, claim 4 has been amended.

On page 3 of the Action, claims 1-4 were rejected under U.S.C. 35 103(a) as being unpatentable over Kaesz et al. (5,403,620) or McCormick et al. (5,372,849) in view of Mynard et al. (3,785,783).

In view of the rejections, claim 1 has been amended to clarify the features of the invention and include the limitations of claim 2 together with additional limitations, and claim 2 has been canceled. Claims 3 and 4 have been amended to clarify the features of the invention. Claim 5 has been canceled to reflect the restriction requirement. New claims 6-10 drawn to a method of manufacturing an aperture plate and directed to the elected invention have been filed.

As recited in claim 1, a method of manufacturing an aperture plate comprises forming a hole having a predetermined diameter in a metal plate with etching while using resist; cleaning the metal plate to remove the resist; placing the metal plate in a vacuum chamber of a chemical vapor deposition device; charging in the vacuum chamber a mixture of a sublimation gas of an osmium oxide crystal, at least one gas selected from the group consisting of an argon gas, a krypton gas and a xenon gas, and a hydrogen gas; and generating plasma inside the vacuum chamber to provide osmium coating on the metal plate.

In the invention, it is possible to uniformly form the osmium coating with a dense structure on the surfaces of the aperture plate and the hole formed in the aperture plate with good repeatability. Further, it is possible to form the osmium coating having high purity.

Kaesz et al. discloses a process of depositing a thin metal film of tungsten and other metals onto a substrate with improved purity. In the process of Kaesz et al., a specific precursor organometallic compound containing a precursor film forming metal compound and a specific precursor catalytic metal compound, is used in the presence of hydrogen gas. A substrate is heated to deposit the film forming metal thereon, and the catalytic metal removes carbon and other heteroatom contaminants as volatile hydrocarbon by products from the deposited metal film. In Kaesz et al., it is stated that the substrates include glass, fused silica, sapphire, silicon and GaSa (col. 5 lines 58-60).

In Kaesz et al., osmium may be included in the organometallic compound and is processed in the presence of hydrogen gas. In the invention, osmium is used, but osmium is not included as the organometallic compound, and is added to the vacuum chamber as the sublimation gas of osmium oxide crystal. Therefore, the present invention is different from Kaesz et al. as the method.

McCormick et al., discloses a method of forming a film comprising iron, ruthenium or osmium on a surface of a substrate. The method of McCormick et al. uses chemical vapor deposition technique to decompose a vapor comprising a specific organo-metallic compound containing metal to be deposited. According to McCormick et al., it is possible to form a continuous film comprising the group VIII metals of high purity and good surface morphology at a low temperature. In McCormick et al., it is stated that the substrate includes metals, graphite, semiconductors, insulators, ceramics and the like (col. 9 lines 30-40).

McCormick et al. deposits osmium film on the substrate, but the specific organo-metallic compound containing the specific metal is used. In the invention, osmium is added to the vacuum chamber as the sublimation gas of osmium oxide crystal. Thus, the invention is different from McCormick et al. as the method.

Also, the invention is directed to a method of manufacturing an aperture plate, wherein a hole having a predetermined diameter is formed in a metal plate with etching while using resist. As the examiner pointed out in the Action, both Kaesz et al. and McCormick

et al. fail to teach the metal plate with the hole of the invention as the substrate. In Kaesz et al. and McCormick et al., there is no disclosure or suggestion of applying the method to manufacture the aperture plate. Therefore, Kaesz et al. and McCormick et al. do not disclose or suggest the features of the invention.

Mynard et al. discloses a hard metal article having one or more working surfaces. The working surfaces are coated with a binder consisting of a carbide and a cobalt binder together with osmium or ruthenium. According to Mynard et al., it is possible to provide a wear resistance article suitable for a cutting tool having improved resistance to wear. The coating may be formed by forming a mixture of particles of metals and sintering the mixture. The coating may also be formed by electro-deposition, plasma-spraying, or vapor deposition.

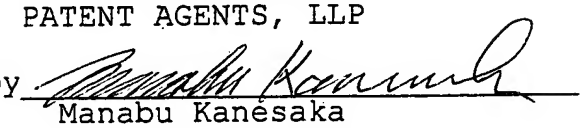
In the method of manufacturing an aperture plate of the invention, a hole having a predetermined diameter is formed in a metal plate. Then, the osmium coating is formed on the metal plate in the vacuum chamber filled with the mixture of a sublimation gas of an osmium oxide crystal, at least one gas selected from the group consisting of an argon gas, a krypton gas and a xenon gas, and a hydrogen gas. Mynard et al. does not disclose or suggest coating the metal plate with the hole to manufacture the aperture plate. Further, Mynard et al. does not disclose or suggest the gas mixture of the invention to deposit the film formed of substantially pure osmium. In Mynard et al., the coating is formed of a mixture of cobalt and osmium as a minor component. Therefore, Mynard et al. does not disclose or suggest the features of the invention.

As explained above, the cited references do not disclose or suggest the method of the invention as recited in claim 1. Even if the cited references are combined, the invention is not obvious from the cited references.

Reconsideration and allowance are earnestly solicited.

Respectfully submitted,

HAUPTMAN KANESAKA BERNER
PATENT AGENTS, LLP

by 
Manabu Kanesaka
Reg. No. 31,467
Agent for Applicants

1700 Diagonal Road, Suite 310
Alexandria, VA 22314
(703) 519-9785